

-- SEQUENCE LISTING

<110> Dahlqvist, Andres  
Stahl, Ulf  
Lenman, Marit  
Banas, Antoni  
Ronne, Hans

<120> A new class of enzymes in the biosynthetic pathway for the production of triacylglycerol and recombinant DNA molecules encoding these enzymes

<130> BASFnae337799PCT1-15

<140> US 09/537,710

<141> 2000-03-30

<150> EP 99106656.4

<151> 1999-04-01

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8'  
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B1  
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|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
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|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
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| Glu | Leu | Arg | Lys | Asn | Glu | Leu | His | His | Lys | His | Trp | Ser | Asn | Pro | Met |
|     |     |     | 500 |     |     |     | 505 |     |     |     |     |     | 510 |     |     |
| Glu | Val | Pro | Leu | Pro | Glu | Ala | Pro | His | Met | Lys | Ile | Tyr | Cys | Ile | Tyr |
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|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |
| Asp | Ser | Ser | Ala | Leu | Asn | Leu | Thr | Ile | Asp | Tyr | Glu | Ser | Lys | Gln | Pro |
| 545 |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |     |
| Val | Phe | Leu | Thr | Glu | Gly | Asp | Gly | Thr | Val | Pro | Leu | Val | Ala | His | Ser |
|     |     |     | 565 |     |     |     |     | 570 |     |     |     |     |     | 575 |     |
| Met | Cys | His | Lys | Trp | Ala | Gln | Gly | Ala | Ser | Pro | Tyr | Asn | Pro | Ala | Gly |
|     |     |     | 580 |     |     |     | 585 |     |     |     |     |     | 590 |     |     |
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|     | 595 |     |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |
| Ile | Arg | Gly | Gly | Ala | Lys | Ser | Ala | Glu | His | Val | Asp | Ile | Leu | Gly | Ser |
|     | 610 |     |     |     |     | 615 |     |     |     |     | 620 |     |     |     |     |
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| 625 |     |     |     | 630 |     |     |     |     | 635 |     |     |     |     | 640 |     |
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B'  
unt



|             |             |             |            |            |             |      |
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| ctggacgaga  | tttgacaaaag | tccgtatagc  | ttaacctggt  | ttaatttcaa  | gtgacagata  | 120  |
| tgccccttat  | tcacggaag   | aagccgacgg  | agaaaccatc  | gacgccgcca  | tctgaagagg  | 180  |
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| attgattttc  | gaggtgctgt  | caaaggctcag | agtatcccaa  | atcacacctg  | tcgtgacgtg  | 1440 |
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| gccgggtaca  | tgtgtgcaaa  | agcgtggcgt  | ggcaagacaa  | gattcaaccc  | ttccggaatc  | 1920 |
| aagacttata  | taagagaata  | caatcactct  | ccgccggcta  | acctgttgga  | agggcgcggg  | 1980 |
| acgcagagtg  | gtgcccattg  | tgatatcatg  | ggaaactttg  | ctttgatcga  | agatatcatg  | 2040 |
| agggttgccg  | cggaggttaa  | cgggtctgat  | ataggacatg  | accaggtcca  | ctctggcata  | 2100 |
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B'  
int.

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Ser Cys Ile Asp Ser Cys Cys Trp Phe Ile Gly Cys Val Cys Val Thr  
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Trp Trp Phe Leu Leu Phe Leu Tyr Asn Ala Met Pro Ala Ser Phe Pro  
65 70 75 80  
Gln Tyr Val Thr Glu Arg Ile Thr Gly Pro Leu Pro Asp Pro Pro Gly  
85 90 95  
Val Lys Leu Lys Lys Glu Gly Leu Lys Ala Lys His Pro Val Val Phe  
100 105 110  
Ile Pro Gly Ile Val Thr Gly Gly Leu Glu Leu Trp Glu Gly Lys Gln  
115 120 125  
Cys Ala Asp Gly Leu Phe Arg Lys Arg Leu Trp Gly Gly Thr Phe Gly  
130 135 140  
Glu Val Tyr Lys Arg Pro Leu Cys Trp Val Glu His Met Ser Leu Asp  
145 150 155 160  
Asn Glu Thr Gly Leu Asp Pro Ala Gly Ile Arg Val Arg Ala Val Ser  
165 170 175  
Gly Leu Val Ala Ala Asp Tyr Phe Ala Pro Gly Tyr Phe Val Trp Ala  
180 185 190  
Val Leu Ile Ala Asn Leu Ala His Ile Gly Tyr Glu Glu Lys Asn Met  
195 200 205  
Tyr Met Ala Ala Tyr Asp Trp Arg Leu Ser Phe Gln Asn Thr Glu Val  
210 215 220  
Arg Asp Gln Thr Leu Ser Arg Met Lys Ser Asn Ile Glu Leu Met Val

B'  
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| Val Leu Tyr Phe Leu His Phe Met Lys Trp Val Glu Ala Pro Ala Pro |     |     |  |     |  |     |
|   | 260 |     |  | 265 |  | 270 |
| Leu Gly Gly Gly Gly Gly Pro Asp Trp Cys Ala Lys Tyr Ile Lys Ala |     |     |  |     |  |     |
|   | 275 |     |  | 280 |  | 285 |
| Val Met Asn Ile Gly Gly Pro Phe Leu Gly Val Pro Lys Ala Val Ala |     |     |  |     |  |     |
|   | 290 |     |  | 295 |  | 300 |
| Gly Leu Phe Ser Ala Glu Ala Lys Asp Val Ala Val Ala Arg Ala Ile |     |     |  |     |  |     |
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| Ala Pro Gly Phe Leu Asp Thr Asp Ile Phe Arg Leu Gln Thr Leu Gln |     |     |  |     |  |     |
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| His Val Met Arg Met Thr Arg Thr Trp Asp Ser Thr Met Ser Met Leu |     |     |  |     |  |     |
|   | 340 |     |  | 345 |  | 350 |
| Pro Lys Gly Gly Asp Thr Ile Trp Gly Gly Leu Asp Trp Ser Pro Glu |     |     |  |     |  |     |
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| Lys Gly His Thr Cys Cys Gly Lys Lys Gln Lys Asn Asn Glu Thr Cys |     |     |  |     |  |     |
|   | 370 |     |  | 375 |  | 380 |
| Gly Glu Ala Gly Glu Asn Gly Val Ser Lys Lys Ser Pro Val Asn Tyr |     |     |  |     |  |     |
|   | 385 |     |  | 390 |  | 395 |
| Gly Arg Met Ile Ser Phe Gly Lys Glu Val Ala Glu Ala Ala Pro Ser |     |     |  |     |  |     |
|   | 405 |     |  | 410 |  | 415 |
| Glu Ile Asn Asn Ile Asp Phe Arg Gly Ala Val Lys Gly Gln Ser Ile |     |     |  |     |  |     |
|   | 420 |     |  | 425 |  | 430 |
| Pro Asn His Thr Cys Arg Asp Val Trp Thr Glu Tyr His Asp Met Gly |     |     |  |     |  |     |
|   | 435 |     |  | 440 |  | 445 |
| Ile Ala Gly Ile Lys Ala Ile Ala Glu Tyr Lys Val Tyr Thr Ala Gly |     |     |  |     |  |     |
|   | 450 |     |  | 455 |  | 460 |
| Glu Ala Ile Asp Leu Leu His Tyr Val Ala Pro Lys Met Met Ala Arg |     |     |  |     |  |     |
|   | 465 |     |  | 470 |  | 475 |
| Gly Ala Ala His Phe Ser Tyr Gly Ile Ala Asp Asp Leu Asp Asp Thr |     |     |  |     |  |     |
|   | 485 |     |  | 490 |  | 495 |
| Lys Tyr Gln Asp Pro Lys Tyr Trp Ser Asn Pro Leu Glu Thr Lys Leu |     |     |  |     |  |     |
|   | 500 |     |  | 505 |  | 510 |
| Pro Asn Ala Pro Glu Met Glu Ile Tyr Ser Leu Tyr Gly Val Gly Ile |     |     |  |     |  |     |
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B'  
cont.

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Cys Ile Pro Phe Gln Ile Phe Thr Ser Ala His Glu Glu Asp Glu Asp  
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Ser Cys Leu Lys Ala Gly Val Tyr Asn Val Asp Gly Asp Glu Thr Val  
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Pro Val Leu Ser Ala Gly Tyr Met Cys Ala Lys Ala Trp Arg Gly Lys  
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Thr Arg Phe Asn Pro Ser Gly Ile Lys Thr Tyr Ile Arg Glu Tyr Asn  
595 600 605

His Ser Pro Pro Ala Asn Leu Leu Glu Gly Arg Gly Thr Gln Ser Gly  
610 615 620

Ala His Val Asp Ile Met Gly Asn Phe Ala Leu Ile Glu Asp Ile Met  
625 630 635 640

Arg Val Ala Ala Gly Gly Asn Gly Ser Asp Ile Gly His Asp Gln Val  
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Asp Glu Thr Val Pro Val Leu Ser Ala Gly Tyr Met Cys Ala Lys Gly  
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Trp Arg Gly Lys Thr Arg Phe Ser Pro Ala Gly Ser Lys Thr Tyr Val  
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acc cag agc ggt gca cat gtt gat ata atg ggg aac ttt gct cta att 240

B!  
cont.

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 Gly Asp Gln Val Tyr Ser Asp Ile Phe Lys Trp Ser Glu Lys Ile Lys  
 100 105 110  
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 65 70 75 80  
 Glu Asp Val Ile Arg Ile Ala Ala Gly Ala Thr Gly Glu Glu Ile Gly  
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<212> DNA

<213> Arabidopsis thaliana

<400> 11

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caaccaaacc acatgtacac tgatttagtt ttcagattat tatggtagac tttaagttga 1680  
gaagaaactt tgactgaaat ctttttattt taataggcta tgatttgttt attgaaatca 1740  
tgtgacatat tgacatgcgc ttctcatggt ttttgttggc aaggettcag ggaactgctc 1800  
ggttgttgtc caattctttt gcgtcgtcat tgtggcttat gccattttca aagaattgca 1860  
agggtgataa cacattctgg acgcattttt ctgggggtgc tgcaaagaaa gataagcgcg 1920  
tataccactg tgatgaagag gaatatcaat caaaatatte tggctggccg acaaataata 1980  
ttaacattga aattccttcc actagcgggt agactctgta tatgcaactg taacataac 2040  
aaaagtttca ccaagaatgt tcaactctcat atttcgttcc tttgatgtgt atccatcagt 2100  
tacagaaaca gctctagtca acatgaccag catggaatgt ggccttccca cccttttgtc 2160  
tttcacagcc cgtgaactag cagatgggac tcttttcaaa gcaatagaag actatgacc 2220  
agatagcaag aggatgttac accagttaaa gaagtacgta cctttctttg tgataagaaa 2280  
tattgctcat cgatcatcac ttgctggctt cttgtacgct aaattgtttt gtttaaattct 2340  
ctatatcaat tgttcatatg ctttgtcttt cttactataa gaaacaagta taatcagaaa 2400  
ccttattatt gattatcagt tctctcctta tattatggaa tgtctttttc gtttacagtt 2460  
atgaatgcaa aagggggtat tttagttgat tgattctctc attctctagt ttgttttgac 2520  
taatagcgtc aattttgttt ttctagcaaa tctttgtgaa ttatatataa catgctaact 2580  
atacttttca ggttgtatca tgatgacct gtttttaatc ctctgactcc ttgggagaga 2640  
ccacctataa aaaatgtatt ttgcatatat ggtgctcatc taaagacaga ggtatgatgc 2700  
attctcaata tcacattatg cgttgacttt gttattatat tccccatttg gtttgcaata 2760  
tctttttgaa ttatgattta tcttctccct tgcactttat gctattaagc gttaaaggta 2820  
ctaaatgtat gaagctgtct gtcatagggt ggttattact ttgccccaaag tggcaaacct 2880  
tatcctgata attggatcat cacggatatc atttatgaaa ctgaagggtc cctcgtgtca 2940  
aggtaatttt ccgcaatggc agaagtaaaa caggaaggca aagtcttctg tatcagtcta 3000  
gtggcatgtt atctcagttg cataagcaaa ttattaaaca actaaaattt aagtactttt 3060  
ttatcattcc ttttgagctt agtggatgat cagtggctta aagtgggaag aggtgttgca 3120

B'  
cont.

tgaaacatga cacttgtatc aaagataact agcaaaaacaa aactaaccce tttctgaatt 3180  
 tcatattatt aggagtagtc gtgcttttaa aaaatttggt ttaagaaacc gaaaaactag 3240  
 ttcatactct gattgtgcaa tatctgcagg tctggaactg tgggtgatgg gaacgctgga 3300  
 cctataactg gggatgagac ggtaagctca gaagttgggt ttgaaattat cttcttgcaa 3360  
 actactgaag actaagataa tacttgcttc tggaacactg cttgctatgt tctctagtac 3420  
 actgcaatat tgactctccg ctacttttat tgattatgaa attgatctct tataggtacc 3480  
 ctatcattca ctctcttggg gcaagaattg gctcggacct aaagttaaca taacaatggc 3540  
 tccccaggta ctctttttta gttcctcacc ttatatagat caaactttaa gtgtactttt 3600  
 ctgggttatgt gttgatttac ctccaatttg ttctttctaa aaatcatata tctctgtact 3660  
 cctcaagaac ttgtattaat cttaaagaga ttctcattgg gaaaataaaa caacagccag 3720  
 aacacgatgg aagcgacgta catgtggaac taaatgttga tcatgagcat gggtcagaca 3780  
 tcatagctaa catgacaaaa gcaccaaggg ttaagtacat aaccttttat gaagactctg 3840  
 agagcattcc ggggaagaga accgcagtct gggagcttga taaaagtggg tattaa 3896

<210> 12  
 <211> 709  
 <212> DNA  
 <213> *Lycopersicon esculentum*

<400> 12  
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 aagtgcattt aaatatagag catcaacatg gtgaagatat cattcccaat atgacaaagt 120  
 tacctacaat gaagtacata acctattatg aggattctga aagttttcca gggacaagaa 180  
 cagcagtttg ggagcttgat aaagcaaate acaggaacat tgtcagatct ccagctttga 240  
 tgcgggagct gtggcttgag atgtggcatg atattcatcc tgataaaaag tccaagtttg 300  
 ttacaaaagg tgggtgtctga tctcactat tttcttctat aaatgtttga gtttgatttg 360  
 acattgtaag tattgcaaca aaaagcaaag cgtgggcctc tgagggatga ggactgctat 420  
 tgggattacg ggaaagctcg atgtgcatgg gctgaacatt gtgaatacag gttagaatat 480  
 tcaaattata ttttgcaaaa tattctcttt ttgtgtattt aggccacctt tccccggtca 540  
 caacgatgca gatatgtatt cggggatgtt cactggggac agagttgcag attgaagagt 600  
 tctacatctc acatcctgtc acactatgtg tgatatttaa gaaactttgt ttggcggaac 660  
 aacaagtttg cacaacatt tgaagaagaa agcgaaatga ttcagagag 709

<210> 13  
 <211> 623  
 <212> PRT  
 <213> *Schizosaccharomyces pombe*

<400> 15  
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 1 5 10 15  
 Lys Ser Pro Ile Asp Leu Pro Asn Ser Lys Lys Pro Thr Arg Ala Leu  
 20 25 30  
 Ser Glu Gln Pro Ser Ala Ser Glu Thr Gln Ser Val Ser Asn Lys Ser  
 35 40 45  
 Arg Lys Ser Lys Phe Gly Lys Arg Leu Asn Phe Ile Leu Gly Ala Ile  
 50 55 60  
 Leu Gly Ile Cys Gly Ala Phe Phe Phe Ala Val Gly Asp Asp Asn Ala  
 65 70 75 80



|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Val | Phe | Asp | Pro | Ala | Thr | Leu | Asp | Lys | Phe | Gly | Asn | Met | Leu | Gly | Ser |  |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |  |
| Ser | Asp | Leu | Phe | Asp | Asp | Ile | Lys | Gly | Tyr | Leu | Ser | Tyr | Asn | Val | Phe |  |
|     |     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |  |
| Lys | Asp | Ala | Pro | Phe | Thr | Thr | Asp | Lys | Pro | Ser | Gln | Ser | Pro | Ser | Gly |  |
|     |     |     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |  |
| Asn | Glu | Val | Gln | Val | Gly | Leu | Asp | Met | Tyr | Asn | Glu | Gly | Tyr | Arg | Ser |  |
|     |     |     |     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |  |
| Asp | His | Pro | Val | Ile | Met | Val | Pro | Gly | Val | Ile | Ser | Ser | Gly | Leu | Glu |  |
|     |     |     |     | 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |  |
| Ser | Trp | Ser | Phe | Asn | Asn | Cys | Ser | Ile | Pro | Tyr | Phe | Arg | Lys | Arg | Leu |  |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |  |
| Trp | Gly | Ser | Trp | Ser | Met | Leu | Lys | Ala | Met | Phe | Leu | Asp | Lys | Gln | Cys |  |
|     |     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |  |
| Trp | Leu | Glu | His | Leu | Met | Leu | Asp | Lys | Lys | Thr | Gly | Leu | Asp | Pro | Lys |  |
|     |     |     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |  |
| Gly | Ile | Lys | Leu | Arg | Ala | Ala | Gln | Gly | Phe | Glu | Ala | Ala | Asp | Phe | Phe |  |
|     |     |     |     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |  |
| Ile | Thr | Gly | Tyr | Trp | Ile | Trp | Ser | Lys | Val | Ile | Glu | Asn | Leu | Ala | Ala |  |
|     |     |     |     | 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |  |
| Ile | Gly | Tyr | Glu | Pro | Asn | Asn | Met | Leu | Ser | Ala | Ser | Tyr | Asp | Trp | Arg |  |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |  |
| Leu | Ser | Tyr | Ala | Asn | Leu | Glu | Glu | Arg | Asp | Lys | Tyr | Phe | Ser | Lys | Leu |  |
|     |     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |  |
| Lys | Met | Phe | Ile | Glu | Tyr | Ser | Asn | Ile | Val | His | Lys | Lys | Lys | Val | Val |  |
|     |     |     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |  |
| Leu | Ile | Ser | His | Ser | Met | Gly | Ser | Gln | Val | Thr | Tyr | Tyr | Phe | Phe | Lys |  |
|     |     |     |     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |  |
| Trp | Val | Glu | Ala | Glu | Gly | Tyr | Gly | Asn | Gly | Gly | Pro | Thr | Trp | Val | Asn |  |
|     |     |     |     | 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |  |
| Asp | His | Ile | Glu | Ala | Phe | Ile | Asn | Ile | Ser | Gly | Ser | Leu | Ile | Gly | Ala |  |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |  |
| Pro | Lys | Thr | Val | Ala | Ala | Leu | Leu | Ser | Gly | Glu | Met | Lys | Asp | Thr | Gly |  |
|     |     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |  |
| Ile | Val | Ile | Thr | Leu | Asn | Ile | Leu | Glu | Lys | Phe | Phe | Ser | Arg | Ser | Glu |  |
|     |     |     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |  |
| Arg | Ala | Met | Met | Val | Arg | Thr | Met | Gly | Gly | Val | Ser | Ser | Met | Leu | Pro |  |

370

375

380

Lys Gly Gly Asp Val Ala Pro Asp Asp Leu Asn Gln Thr Asn Phe Ser  
385 390 395 400

Asn Gly Ala Ile Ile Arg Tyr Arg Glu Asp Ile Asp Lys Asp His Asp  
405 410 415

Glu Phe Asp Ile Asp Asp Ala Leu Gln Phe Leu Lys Asn Val Thr Asp  
420 425 430

Asp Asp Phe Lys Val Met Leu Ala Lys Asn Tyr Ser His Gly Leu Ala  
435 440 445

Trp Thr Glu Lys Glu Val Leu Lys Asn Asn Glu Met Pro Ser Lys Trp  
450 455 460

Ile Asn Pro Leu Glu Thr Ser Leu Pro Tyr Ala Pro Asp Met Lys Ile  
465 470 475 480

Tyr Cys Val His Gly Val Gly Lys Pro Thr Glu Arg Gly Tyr Tyr Tyr  
485 490 495

Thr Asn Asn Pro Glu Gly Gln Pro Val Ile Asp Ser Ser Val Asn Asp  
500 505 510

Gly Thr Lys Val Glu Asn Gly Ile Val Met Asp Asp Gly Asp Gly Thr  
515 520 525

Leu Pro Ile Leu Ala Leu Gly Leu Val Cys Asn Lys Val Trp Gln Thr  
530 535 540

Lys Arg Phe Asn Pro Ala Asn Thr Ser Ile Thr Asn Tyr Glu Ile Lys  
545 550 555 560

His Glu Pro Ala Ala Phe Asp Leu Arg Gly Gly Pro Arg Ser Ala Glu  
565 570 575

His Val Asp Ile Leu Gly His Ser Glu Leu Asn Glu Ile Ile Leu Lys  
580 585 590

Val Ser Ser Gly His Gly Asp Ser Val Pro Asn Arg Tyr Ile Ser Asp  
595 600 605

Ile Gln Glu Ile Ile Asn Glu Ile Asn Leu Asp Lys Pro Arg Asn  
610 615 620

&lt;210&gt; 14

&lt;211&gt; 432

&lt;212&gt; PRT

&lt;213&gt; Arabidopsis thaliana

&lt;400&gt; 14

Met Lys Lys Ile Ser Ser His Tyr Ser Val Val Ile Ala Ile Leu Val

| 1   | 5   | 10  | 15  |
|---|-----|-----|-----|
| Val Val Thr Met Thr Ser Met Cys Gln Ala Val Gly Ser Asn Val Tyr | 20  | 25  | 30  |
| Pro Leu Ile Leu Val Pro Gly Asn Gly Gly Asn Gln Leu Glu Val Arg | 35  | 40  | 45  |
| Leu Asp Arg Glu Tyr Lys Pro Ser Ser Val Trp Cys Ser Ser Trp Leu | 50  | 55  | 60  |
| Tyr Pro Ile His Lys Lys Ser Gly Gly Trp Phe Arg Leu Trp Phe Asp | 65  | 70  | 75  |
| Ala Ala Val Leu Leu Ser Pro Phe Thr Arg Cys Phe Ser Asp Arg Met | 85  | 90  | 95  |
| Met Leu Tyr Tyr Asp Pro Asp Leu Asp Asp Tyr Gln Asn Ala Pro Gly | 100 | 105 | 110 |
| Val Gln Thr Arg Val Pro His Phe Gly Ser Thr Lys Ser Leu Leu Tyr | 115 | 120 | 125 |
| Leu Asp Pro Arg Leu Arg Asp Ala Thr Ser Tyr Met Glu His Leu Val | 130 | 135 | 140 |
| Lys Ala Leu Glu Lys Lys Cys Gly Tyr Val Asn Asp Gln Thr Ile Leu | 145 | 150 | 155 |
| Gly Ala Pro Tyr Asp Phe Arg Tyr Gly Leu Ala Ala Ser Gly His Pro | 165 | 170 | 175 |
| Ser Arg Val Ala Ser Gln Phe Leu Gln Asp Leu Lys Gln Leu Val Glu | 180 | 185 | 190 |
| Lys Thr Ser Ser Glu Asn Glu Gly Lys Pro Val Ile Leu Leu Ser His | 195 | 200 | 205 |
| Ser Leu Gly Gly Leu Phe Val Leu His Phe Leu Asn Arg Thr Thr Pro | 210 | 215 | 220 |
| Ser Trp Arg Arg Lys Tyr Ile Lys His Phe Val Ala Leu Ala Ala Pro | 225 | 230 | 235 |
| Trp Gly Gly Thr Ile Ser Gln Met Lys Thr Phe Ala Ser Gly Asn Thr | 245 | 250 | 255 |
| Leu Gly Val Pro Leu Val Asn Pro Leu Leu Val Arg Arg His Gln Arg | 260 | 265 | 270 |
| Thr Ser Glu Ser Asn Gln Trp Leu Leu Pro Ser Thr Lys Val Phe His | 275 | 280 | 285 |
| Asp Arg Thr Lys Pro Leu Val Val Thr Pro Gln Val Asn Tyr Thr Ala | 290 | 295 | 300 |

B'  
int.

Tyr Glu Met Asp Arg Phe Phe Ala Asp Ile Gly Phe Ser Gln Gly Val  
 305 310 315 320  
 Val Pro Tyr Lys Thr Arg Val Leu Pro Leu Thr Glu Glu Leu Met Thr  
 325 330 335  
 Pro Gly Val Pro Val Thr Cys Ile Tyr Gly Arg Gly Val Asp Thr Pro  
 340 345 350  
 Glu Val Leu Met Tyr Gly Lys Gly Gly Phe Asp Lys Gln Pro Glu Ile  
 355 360 365  
 Lys Tyr Gly Asp Gly Asp Gly Thr Val Asn Leu Ala Ser Leu Ala Ala  
 370 375 380  
 Leu Lys Val Asp Ser Leu Asn Thr Val Glu Ile Asp Gly Val Ser His  
 385 390 395 400  
 Thr Ser Ile Leu Lys Asp Glu Ile Ala Leu Lys Glu Ile Met Lys Gln  
 405 410 415  
 Ile Ser Ile Ile Asn Tyr Glu Leu Ala Asn Val Asn Ala Val Asn Glu  
 420 425 430

B<sup>1</sup>  
 cont.  
 <210> 15  
 <211> 552  
 <212> PRT  
 <213> Arabidopsis thaliana

<400> 15  
 Met Gly Ala Asn Ser Lys Ser Val Thr Ala Ser Phe Thr Val Ile Ala  
 1 5 10 15  
 Val Phe Phe Leu Ile Cys Gly Gly Arg Thr Ala Val Glu Asp Glu Thr  
 20 25 30  
 Glu Phe His Gly Asp Tyr Ser Lys Leu Ser Gly Ile Ile Ile Pro Gly  
 35 40 45  
 Phe Ala Ser Thr Gln Leu Arg Ala Trp Ser Ile Leu Asp Cys Pro Tyr  
 50 55 60  
 Thr Pro Leu Asp Phe Asn Pro Leu Asp Leu Val Trp Leu Asp Thr Thr  
 65 70 75 80  
 Lys Leu Leu Ser Ala Val Asn Cys Trp Phe Lys Cys Met Val Leu Asp  
 85 90 95  
 Pro Tyr Asn Gln Thr Asp His Pro Glu Cys Lys Ser Arg Pro Asp Ser  
 100 105 110

Gly Leu Ser Ala Ile Thr Glu Leu Asp Pro Gly Tyr Ile Thr Gly Pro  
 115 120 125  
 Leu Ser Thr Val Trp Lys Glu Trp Leu Lys Trp Cys Val Glu Phe Gly  
 130 135 140  
 Ile Glu Ala Asn Ala Ile Val Ala Val Pro Tyr Asp Trp Arg Leu Ser  
 145 150 155 160  
 Pro Thr Lys Leu Glu Glu Arg Asp Leu Tyr Phe His Lys Leu Lys Leu  
 165 170 175  
 Thr Phe Glu Thr Ala Leu Lys Leu Arg Gly Gly Pro Ser Ile Val Phe  
 180 185 190  
 Ala His Ser Met Gly Asn Asn Val Phe Arg Tyr Phe Leu Glu Trp Leu  
 195 200 205  
 Arg Leu Glu Ile Ala Pro Lys His Tyr Leu Lys Trp Leu Asp Gln His  
 210 215 220  
 Ile His Ala Tyr Phe Ala Val Gly Ala Pro Leu Leu Gly Ser Val Glu  
 225 230 235 240  
 Ala Ile Lys Ser Thr Leu Ser Gly Val Thr Phe Gly Leu Pro Val Ser  
 245 250 255  
 Glu Gly Thr Ala Arg Leu Leu Ser Asn Ser Phe Ala Ser Ser Leu Trp  
 260 265 270  
 Leu Met Pro Phe Ser Lys Asn Cys Lys Gly Asp Asn Thr Phe Trp Thr  
 275 280 285  
 His Phe Ser Gly Gly Ala Ala Lys Lys Asp Lys Arg Val Tyr His Cys  
 290 295 300  
 Asp Glu Glu Glu Tyr Gln Ser Lys Tyr Ser Gly Trp Pro Thr Asn Ile  
 305 310 315 320  
 Ile Asn Ile Glu Ile Pro Ser Thr Ser Ala Arg Glu Leu Ala Asp Gly  
 325 330 335  
 Thr Leu Phe Lys Ala Ile Glu Asp Tyr Asp Pro Asp Ser Lys Arg Met  
 340 345 350  
 Leu His Gln Leu Lys Lys Tyr Val Pro Phe Phe Val Ile Arg Asn Ile  
 355 360 365  
 Ala His Arg Ser Ser Leu Ala Gly Phe Leu Leu Tyr His Asp Asp Pro  
 370 375 380  
 Val Phe Asn Pro Leu Thr Pro Trp Glu Arg Pro Pro Ile Lys Asn Val  
 385 390 395 400  
 Phe Cys Ile Tyr Gly Ala His Leu Lys Thr Glu Val Gly Tyr Tyr Phe

B'  
 unA

405                      410                      415  
 Ala Pro Ser Gly Lys Pro Tyr Pro Asp Asn Trp Ile Ile Thr Asp Ile  
                          420                      425                      430  
 Ile Tyr Glu Thr Glu Gly Ser Leu Val Ser Arg Ser Gly Thr Val Val  
                          435                      440                      445  
 Asp Gly Asn Ala Gly Pro Ile Thr Gly Asp Glu Thr Val Pro Tyr His  
                          450                      455                      460  
 Ser Leu Ser Trp Cys Lys Asn Trp Leu Gly Pro Lys Val Asn Ile Thr  
                          465                      470                      475                      480  
 Met Ala Pro Gln Ile Leu Ile Gly Lys Ile Lys Gln Gln Pro Glu His  
                          485                      490                      495  
 Asp Gly Ser Asp Val His Val Glu Leu Asn Val Asp His Glu His Gly  
                          500                      505                      510  
 Ser Asp Ile Ile Ala Asn Met Thr Lys Ala Pro Arg Val Lys Tyr Ile  
                          515                      520                      525  
 Thr Phe Tyr Glu Asp Ser Glu Ser Ile Pro Gly Lys Arg Thr Ala Val  
                          530                      535                      540  
 Trp Glu Leu Asp Lys Ser Gly Tyr  
                          545                      550

<210> 1a  
 <211> 661  
 <212> PRT  
 <213> Saccharomyces cerevisiae

<400> 1a  
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   1                      5                      10                      15  
 Asp Glu Asn Asn Lys Gly Gly Ser Val His Asn Lys Arg Glu Ser Arg  
                          20                      25                      30  
 Asn His Ile His His Gln Gln Gly Leu Gly His Lys Arg Arg Arg Gly  
                          35                      40                      45  
 Ile Ser Gly Ser Ala Lys Arg Asn Glu Arg Gly Lys Asp Phe Asp Arg  
                          50                      55                      60  
 Lys Arg Asp Gly Asn Gly Arg Lys Arg Trp Arg Asp Ser Arg Arg Leu  
                          65                      70                      75                      80  
 Ile Phe Ile Leu Gly Ala Phe Leu Gly Val Leu Leu Pro Phe Ser Phe  
                          85                      90                      95  
 Gly Ala Tyr His Val His Asn Ser Asp Ser Asp Leu Phe Asp Asn Phe

| 100 |     |     |     |     |     |     | 105 |     |     |     |     | 110 |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Val | Asn | Phe | Asp | Ser | Leu | Lys | Val | Tyr | Leu | Asp | Asp | Trp | Lys | Asp | Val |  |
| 115 |     |     |     |     |     |     | 120 |     |     |     |     |     | 125 |     |     |  |
| Leu | Pro | Gln | Gly | Ile | Ser | Ser | Phe | Ile | Asp | Asp | Ile | Gln | Ala | Gly | Asn |  |
| 130 |     |     | 135 |     |     |     |     |     |     | 140 |     |     |     |     |     |  |
| Tyr | Ser | Thr | Ser | Ser | Leu | Asp | Asp | Leu | Ser | Glu | Asn | Phe | Ala | Val | Gly |  |
| 145 |     |     | 150 |     |     |     |     |     | 155 |     |     | 160 |     |     |     |  |
| Lys | Gln | Leu | Leu | Arg | Asp | Tyr | Asn | Ile | Glu | Ala | Lys | His | Pro | Val | Val |  |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     | 175 |     |     |     |  |
| Met | Val | Pro | Gly | Val | Ile | Ser | Thr | Gly | Ile | Glu | Ser | Trp | Gly | Val | Ile |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     | 190 |     |     |     |     |  |
| Gly | Asp | Asp | Glu | Cys | Asp | Ser | Ser | Ala | His | Phe | Arg | Lys | Arg | Leu | Trp |  |
|     |     |     | 195 |     |     |     |     | 200 |     |     | 205 |     |     |     |     |  |
| Gly | Ser | Phe | Tyr | Met | Leu | Arg | Thr | Met | Val | Met | Asp | Lys | Val | Cys | Trp |  |
| 210 |     |     | 215 |     |     |     |     |     | 220 |     |     |     |     |     |     |  |
| Leu | Lys | His | Val | Met | Leu | Asp | Pro | Glu | Thr | Gly | Leu | Asp | Pro | Pro | Asn |  |
| 225 |     |     | 230 |     |     |     |     |     | 235 |     |     | 240 |     |     |     |  |
| Phe | Thr | Leu | Arg | Ala | Ala | Gln | Gly | Phe | Glu | Ser | Thr | Asp | Tyr | Phe | Ile |  |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     | 255 |     |     |     |  |
| Ala | Gly | Tyr | Trp | Ile | Trp | Asn | Lys | Val | Phe | Gln | Asn | Leu | Gly | Val | Ile |  |
|     |     |     | 260 |     |     |     |     | 265 |     |     | 270 |     |     |     |     |  |
| Gly | Tyr | Glu | Pro | Asn | Lys | Met | Thr | Ser | Ala | Ala | Tyr | Asp | Trp | Arg | Leu |  |
| 275 |     |     |     |     |     | 280 |     |     |     |     |     | 285 |     |     |     |  |
| Ala | Tyr | Leu | Asp | Leu | Glu | Arg | Arg | Asp | Arg | Tyr | Phe | Thr | Lys | Leu | Lys |  |
| 290 |     |     |     |     |     | 295 |     |     |     |     |     | 300 |     |     |     |  |
| Glu | Gln | Ile | Glu | Leu | Phe | His | Gln | Leu | Ser | Gly | Glu | Lys | Val | Cys | Leu |  |
| 305 |     |     | 310 |     |     |     |     |     | 315 |     |     | 320 |     |     |     |  |
| Ile | Gly | His | Ser | Met | Gly | Ser | Gln | Ile | Ile | Phe | Tyr | Phe | Met | Lys | Trp |  |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     | 335 |     |     |     |  |
| Val | Glu | Ala | Glu | Gly | Pro | Leu | Tyr | Gly | Asn | Gly | Gly | Arg | Gly | Trp | Val |  |
|     |     |     | 340 |     |     |     |     | 345 |     |     | 350 |     |     |     |     |  |
| Asn | Glu | His | Ile | Asp | Ser | Phe | Ile | Asn | Ala | Ala | Gly | Thr | Leu | Leu | Gly |  |
|     |     |     | 355 |     |     |     |     | 360 |     |     | 365 |     |     |     |     |  |
| Ala | Pro | Lys | Ala | Val | Pro | Ala | Leu | Ile | Ser | Gly | Glu | Met | Lys | Asp | Thr |  |
| 370 |     |     | 375 |     |     |     |     |     | 380 |     |     |     |     |     |     |  |
| Ile | Gln | Leu | Asn | Thr | Leu | Ala | Met | Tyr | Gly | Leu | Glu | Lys | Phe | Phe | Ser |  |
| 385 |     |     | 390 |     |     |     |     |     | 395 |     |     | 400 |     |     |     |  |

B'  
int.

Arg Ile Glu Arg Val Lys Met Leu Gln Thr Trp Gly Gly Ile Pro Ser  
 405 410 415  
 Met Leu Pro Lys Gly Glu Glu Val Ile Trp Gly Asp Met Lys Ser Ser  
 420 425 430  
 Ser Glu Asp Ala Leu Asn Asn Asn Thr Asp Thr Tyr Gly Asn Phe Ile  
 435 440 445  
 Arg Phe Glu Arg Asn Thr Ser Asp Ala Phe Asn Lys Asn Leu Thr Met  
 450 455 460  
 Lys Asp Ala Ile Asn Met Thr Leu Ser Ile Ser Pro Glu Trp Leu Gln  
 465 470 475 480  
 Arg Arg Val His Glu Gln Tyr Ser Phe Gly Tyr Ser Lys Asn Glu Glu  
 485 490 495  
 Glu Leu Arg Lys Asn Glu Leu His His Lys His Trp Ser Asn Pro Met  
 500 505 510  
 Glu Val Pro Leu Pro Glu Ala Pro His Met Lys Ile Tyr Cys Ile Tyr  
 515 520 525  
 Gly Val Asn Asn Pro Thr Glu Arg Ala Tyr Val Tyr Lys Glu Glu Asp  
 530 535 540  
 Asp Ser Ser Ala Leu Asn Leu Thr Ile Asp Tyr Glu Ser Lys Gln Pro  
 545 550 555 560  
 Val Phe Leu Thr Glu Gly Asp Gly Thr Val Pro Leu Val Ala His Ser  
 565 570 575  
 Met Cys His Lys Trp Ala Gln Gly Ala Ser Pro Tyr Asn Pro Ala Gly  
 580 585 590  
 Ile Asn Val Thr Ile Val Glu Met Lys His Gln Pro Asp Arg Phe Asp  
 595 600 605  
 Ile Arg Gly Gly Ala Lys Ser Ala Glu His Val Asp Ile Leu Gly Ser  
 610 615 620  
 Ala Glu Leu Asn Asp Tyr Ile Leu Lys Ile Ala Ser Gly Asn Gly Asp  
 625 630 635 640  
 Leu Val Glu Pro Arg Gln Leu Ser Asn Leu Ser Gln Trp Val Ser Gln  
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 Met Pro Phe Pro Met  
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 <211> 387  
 <212> PRT



<213> Arabidopsis thaliana

<400> 2a

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Asn Gln Leu Glu Val Arg Leu Asp Arg Glu Tyr Lys Pro Ser Ser Val  
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Trp Cys Ser Ser Trp Leu Tyr Pro Ile His Lys Lys Ser Gly Gly Trp  
35 40 45

Phe Arg Leu Trp Phe Asp Ala Ala Val Leu Leu Ser Pro Phe Thr Arg  
50 55 60

Cys Phe Ser Asp Arg Met Met Leu Tyr Tyr Asp Pro Asp Leu Asp Asp  
65 70 75 80

Tyr Gln Asn Ala Pro Gly Val Gln Thr Arg Val Pro His Phe Gly Ser  
85 90 95

Thr Lys Ser Leu Leu Tyr Leu Asp Pro Arg Leu Arg Asp Ala Thr Ser  
100 105 110

Tyr Met Glu His Leu Val Lys Ala Leu Glu Lys Lys Cys Gly Tyr Val  
115 120 125

Asn Asp Gln Thr Ile Leu Gly Ala Pro Tyr Asp Phe Arg Tyr Gly Leu  
130 135 140

Ala Ala Ser Gly His Pro Ser Arg Val Ala Ser Gln Phe Leu Gln Asp  
145 150 155 160

Leu Lys Gln Leu Val Glu Lys Thr Ser Ser Glu Asn Glu Gly Lys Pro  
165 170 175

Val Ile Leu Leu Ser His Ser Leu Gly Gly Leu Phe Val Leu His Phe  
180 185 190

Leu Asn Arg Thr Thr Pro Ser Trp Arg Arg Lys Tyr Ile Lys His Phe  
195 200 205

Val Ala Leu Ala Ala Pro Trp Gly Gly Thr Ile Ser Gln Met Lys Thr  
210 215 220

Phe Ala Ser Gly Asn Thr Leu Gly Val Pro Leu Val Asn Pro Leu Leu  
225 230 235 240

Val Arg Arg His Gln Arg Thr Ser Glu Ser Asn Gln Trp Leu Leu Pro  
245 250 255

Ser Thr Lys Val Phe His Asp Arg Thr Lys Pro Leu Val Val Thr Pro  
260 265 270

Gln Val Asn Tyr Thr Ala Tyr Glu Met Asp Arg Phe Phe Ala Asp Ile

B'  
cont.

275                      280                      285  
 Gly Phe Ser Gln Gly Val Val Pro Tyr Lys Thr Arg Val Leu Pro Leu  
 290                      295                      300  
 Thr Glu Glu Leu Met Thr Pro Gly Val Pro Val Thr Cys Ile Tyr Gly  
 305                      310                      315                      320  
 Arg Gly Val Asp Thr Pro Glu Val Leu Met Tyr Gly Lys Gly Gly Phe  
 325                      330                      335  
 Asp Lys Gln Pro Glu Ile Lys Tyr Gly Asp Gly Asp Gly Thr Val Asn  
 340                      345                      350  
 Leu Ala Ser Leu Ala Ala Leu Lys Val Asp Ser Leu Asn Thr Val Glu  
 355                      360                      365  
 Ile Asp Gly Val Ser His Thr Ser Ile Leu Lys Asp Glu Ile Ala Leu  
 370                      375                      380  
 Lys Glu Ile  
 385

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 <213> Arabidopsis thaliana

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 20                      25                      30  
 Asp Gly Leu Phe Arg Lys Arg Leu Trp Gly Gly Thr Phe Leu Cys Trp  
 35                      40                      45  
 Val Glu His Met Ser Leu Asp Asn Glu Thr Gly Leu Asp Pro Ala Gly  
 50                      55                      60  
 Ile Arg Val Arg Ala Val Ser Gly Leu Val Ala Ala Asp Tyr Phe Ala  
 65                      70                      75                      80  
 Pro Gly Tyr Phe Val Trp Ala Val Leu Ile Ala Asn Leu Ala His Ile  
 85                      90                      95  
 Gly Tyr Glu Glu Lys Asn Met Tyr Met Ala Ala Tyr Asp Trp Arg Leu  
 100                      105                      110  
 Ser Phe Gln Asn Thr Glu Arg Asp Gln Thr Leu Ser Arg Met Lys Ser  
 115                      120                      125  
 Asn Ile Glu Leu Met Val Ser Thr Asn Gly Gly Lys Lys Ala Val Ile

130                      135                      140  
 Val Pro His Ser Met Gly Val Leu Tyr Phe Leu His Phe Met Lys Trp  
 145                      150                      155                      160  
 Val Glu Ala Pro Ala Pro Leu Gly Gly Gly Gly Gly Pro Asp Trp Cys  
                                  165                      170                      175  
 Ala Lys Tyr Ile Lys Ala Val Met Asn Ile Gly Gly Pro Phe Leu Gly  
                                  180                      185                      190  
 Val Pro Lys Ala Val Ala Gly Leu Phe Ser Ala Glu Ala Lys Asp Met  
                                  195                      200                      205  
 Arg Met Thr Arg Thr Trp Asp Ser Thr Met Ser Met Leu Pro Lys Gly  
                                  210                      215                      220  
 Gly Asp Thr Ile Trp Gly Gly Leu Asp Trp Ser Pro Glu Leu Pro Asn  
 225                      230                      235                      240  
 Ala Pro Glu Met Glu Ile Tyr Ser Leu Tyr Gly Val Gly Ile Pro Thr  
                                  245                      250                      255  
 Glu Arg Ala Tyr Val Tyr Lys Leu Asn Gln Ser Pro Asp Ser Cys Ile  
                                  260                      265                      270  
 Pro Phe Gln Ile Phe Thr Ser Ala His Glu Glu Asp Glu Asp Ser Cys  
                                  275                      280                      285  
 Leu Lys Ala Gly Val Tyr Asn Val Asp Gly Asp Glu Thr Val Pro Val  
                                  290                      295                      300  
 Leu Ser Ala Gly Tyr Met Cys Ala Lys Ala Trp Arg Gly Lys Thr Arg  
 305                      310                      315                      320  
 Phe Asn Pro Ser Gly Ile Lys Thr Tyr Ile Arg Glu Tyr Asn His Ser  
                                  325                      330                      335  
 Pro Pro Ala Asn Leu Leu Glu Gly Arg Gly Thr Gln Ser Gly Ala His  
                                  340                      345                      350  
 Val Asp Ile Met Gly Asn Phe Ala Leu Ile Glu Asp Ile Met Arg Val  
                                  355                      360                      365  
 Ala Ala Gly Gly Asn Gly Ser Asp Ile Gly His Asp Gln Val His Ser  
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 Gly Ile Phe Glu Trp  
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 cont.

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<220>

<221> CDS

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<400> 4a

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Met Gly Thr Leu Phe Arg Arg Asn Val Gln Asn Gln Lys Ser Asp Ser  
1 5 10 15

gat gaa aac aat aaa ggg ggt tct gtt cat aac aag cga gag agc aga 96  
Asp Glu Asn Asn Lys Gly Gly Ser Val His Asn Lys Arg Glu Ser Arg  
20 25 30

aac cac att cat cat caa cag gga tta ggc cat aag aga aga agg ggt 144  
Asn His Ile His His Gln Gln Gly Leu Gly His Lys Arg Arg Arg Gly  
35 40 45

att agt ggc agt gca aaa aga aat gag cgt ggc aaa gat ttc gac agg 192  
Ile Ser Gly Ser Ala Lys Arg Asn Glu Arg Gly Lys Asp Phe Asp Arg  
50 55 60

aaa aga gac ggg aac ggt aga aaa cgt tgg aga gat tcc aga aga ctg 240  
Lys Arg Asp Gly Asn Gly Arg Lys Arg Trp Arg Asp Ser Arg Arg Leu  
65 70 75 80

B' cont.  
att ttc att ctt ggt gca ttc tta ggt gta ctt ttg ccg ttt agc ttt 288  
Ile Phe Ile Leu Gly Ala Phe Leu Gly Val Leu Leu Pro Phe Ser Phe  
85 90 95

ggc gct tat cat gtt cat aat agc gat agc gac ttg ttt gac aac ttt 336  
Gly Ala Tyr His Val His Asn Ser Asp Ser Asp Leu Phe Asp Asn Phe  
100 105 110

gta aat ttt gat tca ctt aaa gtg tat ttg gat gat tgg aaa gat gtt 384  
Val Asn Phe Asp Ser Leu Lys Val Tyr Leu Asp Asp Trp Lys Asp Val  
115 120 125

ctc cca caa ggt ata agt tcg ttt att gat gat att cag gct ggt aac 432  
Leu Pro Gln Gly Ile Ser Ser Phe Ile Asp Asp Ile Gln Ala Gly Asn  
130 135 140

tac tcc aca tct tct tta gat gat ctc agt gaa aat ttt gcc gtt ggt 480  
Tyr Ser Thr Ser Ser Leu Asp Asp Leu Ser Glu Asn Phe Ala Val Gly  
145 150 155 160

aaa caa ctc tta cgt gat tat aat atc gag gcc aaa cat cct gtt gta 528  
Lys Gln Leu Leu Arg Asp Tyr Asn Ile Glu Ala Lys His Pro Val Val  
165 170 175

atg gtt cct ggt gtc att tct acg gga att gaa agc tgg gga gtt att 576  
Met Val Pro Gly Val Ile Ser Thr Gly Ile Glu Ser Trp Gly Val Ile  
180 185 190

gga gac gat gag tgc gat agt tct gcg cat ttt cgt aaa cgg ctg tgg 624  
Gly Asp Asp Glu Cys Asp Ser Ser Ala His Phe Arg Lys Arg Leu Trp

| 195                         | 200                     | 205             |      |
|-----------------------------|-------------------------|-----------------|------|
| gga agt ttt tac atg ctg     | aga aca atg gtt atg gat | aaa gtt tgt tgg | 672  |
| Gly Ser Phe Tyr Met Leu     | Arg Thr Met Val Met Asp | Lys Val Cys Trp |      |
| 210                         | 215                     | 220             |      |
| ttg aaa cat gta atg tta gat | cct gaa aca ggt ctg gac | cca ccg aac     | 720  |
| Leu Lys His Val Met Leu     | Asp Pro Glu Thr Gly Leu | Asp Pro Pro Asn |      |
| 225                         | 230                     | 235 240         |      |
| ttt acg cta cgt gca gca     | cag ggc ttc gaa tca act | gat tat ttc atc | 768  |
| Phe Thr Leu Arg Ala Ala     | Gln Gly Phe Glu Ser Thr | Asp Tyr Phe Ile |      |
| 245                         | 250                     | 255             |      |
| gca ggg tat tgg att tgg     | aac aaa gtt ttc caa aat | ctg gga gta att | 816  |
| Ala Gly Tyr Trp Ile Trp     | Asn Lys Val Phe Gln Asn | Leu Gly Val Ile |      |
| 260                         | 265                     | 270             |      |
| ggc tat gaa ccc aat aaa     | atg acg agt gct gcg tat | gat tgg agg ctt | 864  |
| Gly Tyr Glu Pro Asn Lys     | Met Thr Ser Ala Ala Tyr | Asp Trp Arg Leu |      |
| 275                         | 280                     | 285             |      |
| gca tat tta gat cta gaa     | aga cgc gat agg tac ttt | acg aag cta aag | 912  |
| Ala Tyr Leu Asp Leu Glu     | Arg Arg Asp Arg Tyr Phe | Thr Lys Leu Lys |      |
| 290                         | 295                     | 300             |      |
| gaa caa atc gaa ctg ttt     | cat caa ttg agt ggt gaa | aaa gtt tgt tta | 960  |
| Glu Gln Ile Glu Leu Phe     | His Gln Leu Ser Gly Glu | Lys Val Cys Leu |      |
| 305                         | 310                     | 315 320         |      |
| att gga cat tct atg ggt     | tct cag att atc ttt tac | ttt atg aaa tgg | 1008 |
| Ile Gly His Ser Met Gly     | Ser Gln Ile Ile Phe Tyr | Phe Met Lys Trp |      |
| 325                         | 330                     | 335             |      |
| gtc gag gct gaa ggc cct     | ctt tac ggt aat ggt ggt | cgt ggc tgg gtt | 1056 |
| Val Glu Ala Glu Gly Pro     | Leu Tyr Gly Asn Gly Gly | Arg Gly Trp Val |      |
| 340                         | 345                     | 350             |      |
| aac gaa cac ata gat tca     | ttc att aat gca gca ggg | acg ctt ctg ggc | 1104 |
| Asn Glu His Ile Asp Ser     | Phe Ile Asn Ala Ala Gly | Thr Leu Leu Gly |      |
| 355                         | 360                     | 365             |      |
| gct cca aag gca gtt cca     | gct cta att agt ggt gaa | atg aaa gat acc | 1152 |
| Ala Pro Lys Ala Val Pro     | Ala Leu Ile Ser Gly Glu | Met Lys Asp Thr |      |
| 370                         | 375                     | 380             |      |
| att caa tta aat acg tta     | gcc atg tat ggt ttg gaa | aag ttc ttc tca | 1200 |
| Ile Gln Leu Asn Thr Leu     | Ala Met Tyr Gly Leu Glu | Lys Phe Phe Ser |      |
| 385                         | 390                     | 395 400         |      |
| aga att gag aga gta aaa     | atg tta caa acg tgg ggt | ggt ata cca tca | 1248 |
| Arg Ile Glu Arg Val Lys     | Met Leu Gln Thr Trp Gly | Gly Ile Pro Ser |      |
| 405                         | 410                     | 415             |      |
| atg cta cca aag gga gaa     | gag gtc att tgg ggg gat | atg aag tca tct | 1296 |

B'  
wt.

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Met | Leu | Pro | Lys | Gly | Glu | Glu | Val | Ile | Trp | Gly | Asp | Met | Lys | Ser | Ser |      |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |      |
| tca | gag | gat | gca | ttg | aat | aac | aac | act | gac | aca | tac | ggc | aat | ttc | att | 1344 |
| Ser | Glu | Asp | Ala | Leu | Asn | Asn | Asn | Thr | Asp | Thr | Tyr | Gly | Asn | Phe | Ile |      |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |      |
| cga | ttt | gaa | agg | aat | acg | agc | gat | gct | ttc | aac | aaa | aat | ttg | aca | atg | 1392 |
| Arg | Phe | Glu | Arg | Asn | Thr | Ser | Asp | Ala | Phe | Asn | Lys | Asn | Leu | Thr | Met |      |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |      |
| aaa | gac | gcc | att | aac | atg | aca | tta | tcg | ata | tca | cct | gaa | tgg | ctc | caa | 1440 |
| Lys | Asp | Ala | Ile | Asn | Met | Thr | Leu | Ser | Ile | Ser | Pro | Glu | Trp | Leu | Gln |      |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |      |
| aga | aga | gta | cat | gag | cag | tac | tcg | ttc | ggc | tat | tcc | aag | aat | gaa | gaa | 1488 |
| Arg | Arg | Val | His | Glu | Gln | Tyr | Ser | Phe | Gly | Tyr | Ser | Lys | Asn | Glu | Glu |      |
|     |     |     | 485 |     |     |     |     |     | 490 |     |     |     |     | 495 |     |      |
| gag | tta | aga | aaa | aat | gag | cta | cac | cac | aag | cac | tgg | tcg | aat | cca | atg | 1536 |
| Glu | Leu | Arg | Lys | Asn | Glu | Leu | His | His | Lys | His | Trp | Ser | Asn | Pro | Met |      |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |      |
| gaa | gta | cca | ctt | cca | gaa | gct | ccc | cac | atg | aaa | atc | tat | tgt | ata | tac | 1584 |
| Glu | Val | Pro | Leu | Pro | Glu | Ala | Pro | His | Met | Lys | Ile | Tyr | Cys | Ile | Tyr |      |
|     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |      |
| ggg | gtg | aac | aac | cca | act | gaa | agg | gca | tat | gta | tat | aag | gaa | gag | gat | 1632 |
| Gly | Val | Asn | Asn | Pro | Thr | Glu | Arg | Ala | Tyr | Val | Tyr | Lys | Glu | Glu | Asp |      |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |      |
| gac | tcc | tct | gct | ctg | aat | ttg | acc | atc | gac | tac | gaa | agc | aag | caa | cct | 1680 |
| Asp | Ser | Ser | Ala | Leu | Asn | Leu | Thr | Ile | Asp | Tyr | Glu | Ser | Lys | Gln | Pro |      |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |      |
| gta | ttc | ctc | acc | gag | ggg | gac | gga | acc | gtt | ccg | ctc | gtg | gcg | cat | tca | 1728 |
| Val | Phe | Leu | Thr | Glu | Gly | Asp | Gly | Thr | Val | Pro | Leu | Val | Ala | His | Ser |      |
|     |     |     | 565 |     |     |     |     | 570 |     |     |     |     |     | 575 |     |      |
| atg | tgt | cac | aaa | tgg | gcc | cag | ggt | gct | tca | ccg | tac | aac | cct | gcc | gga | 1776 |
| Met | Cys | His | Lys | Trp | Ala | Gln | Gly | Ala | Ser | Pro | Tyr | Asn | Pro | Ala | Gly |      |
|     |     |     | 580 |     |     |     | 585 |     |     |     |     |     | 590 |     |     |      |
| att | aac | gtt | act | att | gtg | gaa | atg | aaa | cac | cag | cca | gat | cga | ttt | gat | 1824 |
| Ile | Asn | Val | Thr | Ile | Val | Glu | Met | Lys | His | Gln | Pro | Asp | Arg | Phe | Asp |      |
|     |     | 595 |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |      |
| ata | cgt | ggt | gga | gca | aaa | agc | gcc | gaa | cac | gta | gac | atc | ctc | ggc | agc | 1872 |
| Ile | Arg | Gly | Gly | Ala | Lys | Ser | Ala | Glu | His | Val | Asp | Ile | Leu | Gly | Ser |      |
|     | 610 |     |     |     |     | 615 |     |     |     |     | 620 |     |     |     |     |      |
| gcg | gag | ttg | aac | gat | tac | atc | ttg | aaa | att | gca | agc | ggt | aat | ggc | gat | 1920 |
| Ala | Glu | Leu | Asn | Asp | Tyr | Ile | Leu | Lys | Ile | Ala | Ser | Gly | Asn | Gly | Asp |      |
| 625 |     |     |     |     | 630 |     |     |     |     | 635 |     |     |     |     | 640 |      |

B'  
cont.

|   |      |
|---|------|
| ctc gtc gag cca cgc caa ttg tct aat ttg agc cag tgg gtt tct cag | 1968 |
| Leu Val Glu Pro Arg Gln Leu Ser Asn Leu Ser Gln Trp Val Ser Gln |      |
| 645 650 655   |      |

|                         |      |
|-------------------------|------|
| atg ccc ttc cca atg taa | 1986 |
| Met Pro Phe Pro Met     |      |
| 660                     |      |

<210> 5a  
 <211> 661  
 <212> PRT  
 <213> *Saccharomyces cerevisiae*

|   |
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| <400> 5a  |
| Met Gly Thr Leu Phe Arg Arg Asn Val Gln Asn Gln Lys Ser Asp Ser |
| 1 5 10 15   |

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| Asp Glu Asn Asn Lys Gly Gly Ser Val His Asn Lys Arg Glu Ser Arg |
| 20 25 30  |

|   |
|---|
| Asn His Ile His His Gln Gln Gly Leu Gly His Lys Arg Arg Arg Gly |
| 35 40 45  |

|   |
|---|
| Ile Ser Gly Ser Ala Lys Arg Asn Glu Arg Gly Lys Asp Phe Asp Arg |
| 50 55 60  |

|   |
|---|
| Lys Arg Asp Gly Asn Gly Arg Lys Arg Trp Arg Asp Ser Arg Arg Leu |
| 65 70 75 80   |

|   |
|---|
| Ile Phe Ile Leu Gly Ala Phe Leu Gly Val Leu Leu Pro Phe Ser Phe |
| 85 90 95  |

|   |
|---|
| Gly Ala Tyr His Val His Asn Ser Asp Ser Asp Leu Phe Asp Asn Phe |
| 100 105 110   |

|   |
|---|
| Val Asn Phe Asp Ser Leu Lys Val Tyr Leu Asp Asp Trp Lys Asp Val |
| 115 120 125   |

|   |
|---|
| Leu Pro Gln Gly Ile Ser Ser Phe Ile Asp Asp Ile Gln Ala Gly Asn |
| 130 135 140   |

|   |
|---|
| Tyr Ser Thr Ser Ser Leu Asp Asp Leu Ser Glu Asn Phe Ala Val Gly |
| 145 150 155 160   |

|   |
|---|
| Lys Gln Leu Leu Arg Asp Tyr Asn Ile Glu Ala Lys His Pro Val Val |
| 165 170 175   |

|   |
|---|
| Met Val Pro Gly Val Ile Ser Thr Gly Ile Glu Ser Trp Gly Val Ile |
| 180 185 190   |

|   |
|---|
| Gly Asp Asp Glu Cys Asp Ser Ser Ala His Phe Arg Lys Arg Leu Trp |
| 195 200 205   |

|   |
|---|
| Gly Ser Phe Tyr Met Leu Arg Thr Met Val Met Asp Lys Val Cys Trp |
|---|

B'  
 cont.

| 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Lys | His | Val | Met | Leu | Asp | Pro | Glu | Thr | Gly | Leu | Asp | Pro | Pro | Asn |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Phe | Thr | Leu | Arg | Ala | Ala | Gln | Gly | Phe | Glu | Ser | Thr | Asp | Tyr | Phe | Ile |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Ala | Gly | Tyr | Trp | Ile | Trp | Asn | Lys | Val | Phe | Gln | Asn | Leu | Gly | Val | Ile |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Gly | Tyr | Glu | Pro | Asn | Lys | Met | Thr | Ser | Ala | Ala | Tyr | Asp | Trp | Arg | Leu |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Ala | Tyr | Leu | Asp | Leu | Glu | Arg | Arg | Asp | Arg | Tyr | Phe | Thr | Lys | Leu | Lys |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Glu | Gln | Ile | Glu | Leu | Phe | His | Gln | Leu | Ser | Gly | Glu | Lys | Val | Cys | Leu |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Ile | Gly | His | Ser | Met | Gly | Ser | Gln | Ile | Ile | Phe | Tyr | Phe | Met | Lys | Trp |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Val | Glu | Ala | Glu | Gly | Pro | Leu | Tyr | Gly | Asn | Gly | Gly | Arg | Gly | Trp | Val |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Asn | Glu | His | Ile | Asp | Ser | Phe | Ile | Asn | Ala | Ala | Gly | Thr | Leu | Leu | Gly |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Ala | Pro | Lys | Ala | Val | Pro | Ala | Leu | Ile | Ser | Gly | Glu | Met | Lys | Asp | Thr |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Ile | Gln | Leu | Asn | Thr | Leu | Ala | Met | Tyr | Gly | Leu | Glu | Lys | Phe | Phe | Ser |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Arg | Ile | Glu | Arg | Val | Lys | Met | Leu | Gln | Thr | Trp | Gly | Gly | Ile | Pro | Ser |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Met | Leu | Pro | Lys | Gly | Glu | Glu | Val | Ile | Trp | Gly | Asp | Met | Lys | Ser | Ser |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Ser | Glu | Asp | Ala | Leu | Asn | Asn | Asn | Thr | Asp | Thr | Tyr | Gly | Asn | Phe | Ile |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Arg | Phe | Glu | Arg | Asn | Thr | Ser | Asp | Ala | Phe | Asn | Lys | Asn | Leu | Thr | Met |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| Lys | Asp | Ala | Ile | Asn | Met | Thr | Leu | Ser | Ile | Ser | Pro | Glu | Trp | Leu | Gln |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
| Arg | Arg | Val | His | Glu | Gln | Tyr | Ser | Phe | Gly | Tyr | Ser | Lys | Asn | Glu | Glu |
|     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |
| Glu | Leu | Arg | Lys | Asn | Glu | Leu | His | His | Lys | His | Trp | Ser | Asn | Pro | Met |
|     |     |     | 500 |     |     |     | 505 |     |     |     |     |     | 510 |     |     |

B'  
cont.



Glu Val Pro Leu Pro Glu Ala Pro His Met Lys Ile Tyr Cys Ile Tyr  
515 520 525

Gly Val Asn Asn Pro Thr Glu Arg Ala Tyr Val Tyr Lys Glu Glu Asp  
530 535 540

Asp Ser Ser Ala Leu Asn Leu Thr Ile Asp Tyr Glu Ser Lys Gln Pro  
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Val Phe Leu Thr Glu Gly Asp Gly Thr Val Pro Leu Val Ala His Ser  
565 570 575

Met Cys His Lys Trp Ala Gln Gly Ala Ser Pro Tyr Asn Pro Ala Gly  
580 585 590

Ile Asn Val Thr Ile Val Glu Met Lys His Gln Pro Asp Arg Phe Asp  
595 600 605

Ile Arg Gly Gly Ala Lys Ser Ala Glu His Val Asp Ile Leu Gly Ser  
610 615 620

Ala Glu Leu Asn Asp Tyr Ile Leu Lys Ile Ala Ser Gly Asn Gly Asp  
625 630 635 640

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Met Pro Phe Pro Met  
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1 5 10 15  
gat gaa aac aat aaa ggg ggt tct gtt cat aac aag cga gag agc aga 96  
Asp Glu Asn Asn Lys Gly Gly Ser Val His Asn Lys Arg Glu Ser Arg  
20 25 30  
aac cac att cat cat caa cag gga tta ggc cat aag aga aga agg ggt 144  
Asn His Ile His His Gln Gln Gly Leu Gly His Lys Arg Arg Arg Gly  
35 40 45  
att agt ggc agt gca aaa aga aat gag cgt ggc aaa gat ttc gac agg 192  
Ile Ser Gly Ser Ala Lys Arg Asn Glu Arg Gly Lys Asp Phe Asp Arg  
50 55 60

|   |     |
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| aaa aga gac ggg aac ggt aga aaa cgt tgg aga gat tcc aga aga ctg | 240 |
| Lys Arg Asp Gly Asn Gly Arg Lys Arg Trp Arg Asp Ser Arg Arg Leu |     |
| 65 70 75 80   |     |
| att ttc att ctt ggt gca ttc tta ggt gta ctt ttg ccg ttt agc ttt | 288 |
| Ile Phe Ile Leu Gly Ala Phe Leu Gly Val Leu Leu Pro Phe Ser Phe |     |
| 85 90 95  |     |
| ggc gct tat cat gtt cat aat agc gat agc gac ttg ttt gac aac ttt | 336 |
| Gly Ala Tyr His Val His Asn Ser Asp Ser Asp Leu Phe Asp Asn Phe |     |
| 100 105 110   |     |
| gta aat ttt gat tca ctt aaa gtg tat ttg gat gat tgg aaa gat gtt | 384 |
| Val Asn Phe Asp Ser Leu Lys Val Tyr Leu Asp Asp Trp Lys Asp Val |     |
| 115 120 125   |     |
| ctc cca caa ggt ata agt tcg ttt att gat gat att cag gct ggt aac | 432 |
| Leu Pro Gln Gly Ile Ser Ser Phe Ile Asp Asp Ile Gln Ala Gly Asn |     |
| 130 135 140   |     |
| tac tcc aca tct tct tta gat gat ctc agt gaa aat ttt gcc gtt ggt | 480 |
| Tyr Ser Thr Ser Ser Leu Asp Asp Leu Ser Glu Asn Phe Ala Val Gly |     |
| 145 150 155 160   |     |
| aaa caa ctc tta cgt gat tat aat atc gag gcc aaa cat cct gtt gta | 528 |
| Lys Gln Leu Leu Arg Asp Tyr Asn Ile Glu Ala Lys His Pro Val Val |     |
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| atg gtt cct ggt gtc att tct acg gga att gaa agc tgg gga gtt att | 576 |
| Met Val Pro Gly Val Ile Ser Thr Gly Ile Glu Ser Trp Gly Val Ile |     |
| 180 185 190   |     |
| gga gac gat gag tgc gat agt tct gcg cat ttt cgt aaa cgg ctg tgg | 624 |
| Gly Asp Asp Glu Cys Asp Ser Ser Ala His Phe Arg Lys Arg Leu Trp |     |
| 195 200 205   |     |
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| Gly Ser Phe Tyr Met Leu Arg Thr Met Val Met Asp Lys Val Cys Trp |     |
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| ttg aaa cat gta atg tta gat cct gaa aca ggt ctg gac cca ccg aac | 720 |
| Leu Lys His Val Met Leu Asp Pro Glu Thr Gly Leu Asp Pro Pro Asn |     |
| 225 230 235 240   |     |
| ttt acg cta cgt gca gca cag ggc ttc gaa tca act gat tat ttc atc | 768 |
| Phe Thr Leu Arg Ala Ala Gln Gly Phe Glu Ser Thr Asp Tyr Phe Ile |     |
| 245 250 255   |     |
| gca ggg tat tgg att tgg aac aaa gtt ttc caa aat ctg gga gta att | 816 |
| Ala Gly Tyr Trp Ile Trp Asn Lys Val Phe Gln Asn Leu Gly Val Ile |     |
| 260 265 270   |     |
| ggc tat gaa ccc aat aaa atg acg agt gct gcg tat gat tgg agg ctt | 864 |
| Gly Tyr Glu Pro Asn Lys Met Thr Ser Ala Ala Tyr Asp Trp Arg Leu |     |
| 275 280 285   |     |

B1  
cont.

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|---|------|
| gca tat tta gat cta gaa aga cgc gat agg tac ttt acg aag cta aag | 912  |
| Ala Tyr Leu Asp Leu Glu Arg Arg Asp Arg Tyr Phe Thr Lys Leu Lys |      |
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| gaa caa atc gaa ctg ttt cat caa ttg agt ggt gaa aaa gtt tgt tta | 960  |
| Glu Gln Ile Glu Leu Phe His Gln Leu Ser Gly Glu Lys Val Cys Leu |      |
| 305 310 315 320   |      |
| att gga cat tct atg ggt tct cag att atc ttt tac ttt atg aaa tgg | 1008 |
| Ile Gly His Ser Met Gly Ser Gln Ile Ile Phe Tyr Phe Met Lys Trp |      |
| 325 330 335   |      |
| gtc gag gct gaa ggc cct ctt tac ggt aat ggt ggt cgt ggc tgg gtt | 1056 |
| Val Glu Ala Glu Gly Pro Leu Tyr Gly Asn Gly Gly Arg Gly Trp Val |      |
| 340 345 350   |      |
| aac gaa cac ata gat tca ttc att aat gca gca ggg acg ctt ctg ggc | 1104 |
| Asn Glu His Ile Asp Ser Phe Ile Asn Ala Ala Gly Thr Leu Leu Gly |      |
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| gct cca aag gca gtt cca gct cta att agt ggt gaa atg aaa gat acc | 1152 |
| Ala Pro Lys Ala Val Pro Ala Leu Ile Ser Gly Glu Met Lys Asp Thr |      |
| 370 375 380   |      |
| att caa tta aat acg tta gcc atg tat ggt ttg gaa aag ttc ttc tca | 1200 |
| Ile Gln Leu Asn Thr Leu Ala Met Tyr Gly Leu Glu Lys Phe Phe Ser |      |
| 385 390 395 400   |      |
| aga att gag aga gta aaa atg tta caa acg tgg ggt ggt ata cca tca | 1248 |
| Arg Ile Glu Arg Val Lys Met Leu Gln Thr Trp Gly Gly Ile Pro Ser |      |
| 405 410 415   |      |
| atg cta cca aag gga gaa gag gtc att tgg ggg gat atg aag tca tct | 1296 |
| Met Leu Pro Lys Gly Glu Glu Val Ile Trp Gly Asp Met Lys Ser Ser |      |
| 420 425 430   |      |
| tca gag gat gca ttg aat aac aac act gac aca tac ggc aat ttc att | 1344 |
| Ser Glu Asp Ala Leu Asn Asn Asn Thr Asp Thr Tyr Gly Asn Phe Ile |      |
| 435 440 445   |      |
| cga ttt gaa agg aat acg agc gat gct ttc aac aaa aat ttg aca atg | 1392 |
| Arg Phe Glu Arg Asn Thr Ser Asp Ala Phe Asn Lys Asn Leu Thr Met |      |
| 450 455 460   |      |
| aaa gac gcc att aac atg aca tta tcg ata tca cct gaa tgg ctc caa | 1440 |
| Lys Asp Ala Ile Asn Met Thr Leu Ser Ile Ser Pro Glu Trp Leu Gln |      |
| 465 470 475 480   |      |
| aga aga gta cat gag cag tac tcg ttc ggc tat tcc aag aat gaa gaa | 1488 |
| Arg Arg Val His Glu Gln Tyr Ser Phe Gly Tyr Ser Lys Asn Glu Glu |      |
| 485 490 495   |      |
| gag tta aga aaa aat gag cta cac cac aag cac tgg tcg aat cca atg | 1536 |
| Glu Leu Arg Lys Asn Glu Leu His His Lys His Trp Ser Asn Pro Met |      |
| 500 505 510   |      |

B'  
cont.

gaa gta cca ctt cca gaa gct ccc cac atg aaa atc tat tgt ata tac 1584  
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 530 535 540

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 Asp Ser Ser Ala Leu Asn Leu Thr Ile Asp Tyr Glu Ser Lys Gln Pro  
 545 550 555 560

gta ttc ctc acc gag ggg gac gga acc gtt ccg ctc gtg gcg cat tca 1728  
 Val Phe Leu Thr Glu Gly Asp Gly Thr Val Pro Leu Val Ala His Ser  
 565 570 575

atg tgt cac aaa tgg gcc cag ggt gct tca ccg tac aac cct gcc gga 1776  
 Met Cys His Lys Trp Ala Gln Gly Ala Ser Pro Tyr Asn Pro Ala Gly  
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att aac gtt act att gtg gaa atg aaa cac cag cca gat cga ttt gat 1824  
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 595 600 605

ata cgt ggt gga gca aaa agc gcc gaa cac gta gac atc ctc ggc agc 1872  
 Ile Arg Gly Gly Ala Lys Ser Ala Glu His Val Asp Ile Leu Gly Ser  
 610 615 620

gcg gag ttg aac gat tac atc ttg aaa att gca agc ggt aat ggc gat 1920  
 Ala Glu Leu Asn Asp Tyr Ile Leu Lys Ile Ala Ser Gly Asn Gly Asp  
 625 630 635 640

ctc gtc gag cca cgc caa ttg tct aat ttg agc cag tgg gtt tct cag 1968  
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Asn His Ile His His Gln Gln Gly Leu Gly His Lys Arg Arg Arg Gly  
 35 40 45

B'  
 cont.

Ile Ser Gly Ser Ala Lys Arg Asn Glu Arg Gly Lys Asp Phe Asp Arg  
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 85 90 95  
 Gly Ala Tyr His Val His Asn Ser Asp Ser Asp Leu Phe Asp Asn Phe  
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 Val Asn Phe Asp Ser Leu Lys Val Tyr Leu Asp Asp Trp Lys Asp Val  
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 130 135 140  
 Tyr Ser Thr Ser Ser Leu Asp Asp Leu Ser Glu Asn Phe Ala Val Gly  
 145 150 155 160  
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 180 185 190  
 Gly Asp Asp Glu Cys Asp Ser Ser Ala His Phe Arg Lys Arg Leu Trp  
 195 200 205  
 Gly Ser Phe Tyr Met Leu Arg Thr Met Val Met Asp Lys Val Cys Trp  
 210 215 220  
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 225 230 235 240  
 Phe Thr Leu Arg Ala Ala Gln Gly Phe Glu Ser Thr Asp Tyr Phe Ile  
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 Ala Gly Tyr Trp Ile Trp Asn Lys Val Phe Gln Asn Leu Gly Val Ile  
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 Gly Tyr Glu Pro Asn Lys Met Thr Ser Ala Ala Tyr Asp Trp Arg Leu  
 275 280 285  
 Ala Tyr Leu Asp Leu Glu Arg Arg Asp Arg Tyr Phe Thr Lys Leu Lys  
 290 295 300  
 Glu Gln Ile Glu Leu Phe His Gln Leu Ser Gly Glu Lys Val Cys Leu  
 305 310 315 320  
 Ile Gly His Ser Met Gly Ser Gln Ile Ile Phe Tyr Phe Met Lys Trp  
 325 330 335  
 Val Glu Ala Glu Gly Pro Leu Tyr Gly Asn Gly Gly Arg Gly Trp Val

B1  
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Met Pro Phe Pro Met  
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B'  
unt



```

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 Met Pro Leu Ile His Arg Lys Lys Pro Thr Glu Lys Pro Ser Thr Pro  
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cca tct gaa gag gtg gtg cac gat gag gat tcg caa aag aaa cca cac 215  
 Pro Ser Glu Glu Val Val His Asp Glu Asp Ser Gln Lys Lys Pro His  
 20 25 30

gaa tct tcc aaa tcc cac cat aag naa tcg aac gga gga ggg aag tgg 263  
 Glu Ser Ser Lys Ser His His Lys Xaa Ser Asn Gly Gly Gly Lys Trp  
 35 40 45

tog tgc atc gat tct tgt tgt tgg ttc att ggg tgt gtg tgt gta acc 311  
 Ser Cys Ile Asp Ser Cys Cys Trp Phe Ile Gly Cys Val Cys Val Thr  
 50 55 60

tgg tgg ttt ctt ctc ttc ctt tac aac gca atg cct gcg agc ttc cct 359  
 Trp Trp Phe Leu Leu Phe Leu Tyr Asn Ala Met Pro Ala Ser Phe Pro  
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 Gln Tyr Val Thr Glu Pro Asn His Xaa Ser Phe Ala Leu Pro  
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<212> DNA  
<213> Zea mays

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<400> 6b

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gat gaa act gtt cca gtt ctt agt gcg ggc tac atg tgt gcg aaa gga 96  
Asp Glu Thr Val Pro Val Leu Ser Ala Gly Tyr Met Cys Ala Lys Gly  
20 25 30

tgg cgt ggc aaa act cgt ttc agc cct gcc ggc agc aag act tac gtg 144  
Trp Arg Gly Lys Thr Arg Phe Ser Pro Ala Gly Ser Lys Thr Tyr Val  
35 40 45

aga gaa tac agc cat tcg cca ccc tct act ctc ctg gaa ggc agg ggc 192  
Arg Glu Tyr Ser His Ser Pro Pro Ser Thr Leu Leu Glu Gly Arg Gly  
50 55 60

acc cag agc ggt gca cat gtt gat ata atg ggg aac ttt gct cta att 240  
Thr Gln Ser Gly Ala His Val Asp Ile Met Gly Asn Phe Ala Leu Ile  
65 70 75 80

gag gac gtc atc aga ata gct gct ggg gca acc ggt gag gaa att ggt 288  
Glu Asp Val Ile Arg Ile Ala Ala Gly Ala Thr Gly Glu Glu Ile Gly  
85 90 95

ggc gat cag gtt tat tca gat ata ttc aag tgg tca gag aaa atc aaa 336  
Gly Asp Gln Val Tyr Ser Asp Ile Phe Lys Trp Ser Glu Lys Ile Lys  
100 105 110

ttg aaa ttg taa cct atg gga agt taa aga agt gcc gac ccg ttt att 384  
Leu Lys Leu Pro Met Gly Ser Arg Ser Ala Asp Pro Phe Ile  
115 120 125

gcg ttc caa agt gtc ctg cctgagtgcg actctggatt ttgcttaaatt 432  
Ala Phe Gln Ser Val Leu  
130

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tgcgatacga tgttgtaccg ctatttttcag cattgtatat taaactgtac aggtgtaagt 552

tgcatttgcc agctgaaatt gtgtagtcgt tttctttacg atttaaatanc aagtggcgga 612

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 <212> PRT  
 <213> Zea mays

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           20                  25                  30  
 Trp Arg Gly Lys Thr Arg Phe Ser Pro Ala Gly Ser Lys Thr Tyr Val  
           35                  40                  45  
 Arg Glu Tyr Ser His Ser Pro Pro Ser Thr Leu Leu Glu Gly Arg Gly  
           50                  55                  60  
 Thr Gln Ser Gly Ala His Val Asp Ile Met Gly Asn Phe Ala Leu Ile  
   65                  70                  75                  80  
 Glu Asp Val Ile Arg Ile Ala Ala Gly Ala Thr Gly Glu Glu Ile Gly  
                   85                  90                  95  
 Gly Asp Gln Val Tyr Ser Asp Ile Phe Lys Trp Ser Glu Lys Ile Lys  
                   100                  105                  110  
 Leu Lys Leu  
           115

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 cagaacgggt caatccgaga ggagggccga atacggcgga cttaaataatg tagaaaagg 420  
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 <212> DNA  
 <213> Arabidopsis thaliana

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|            |             |             |            |            |            |      |
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| ggttcgacca | aatcacttct  | atacctcgac  | cctcgtctcc | ggttagtact | ttccaagata | 420  |
| tatcattttg | ggacatttgc  | ataatgaaca  | aaatagacat | aaatttgggg | gattattggt | 480  |
| atatcaatat | ccattttatat | gctagtcggt  | aatgtgagt  | ttatgttagt | atagttaatg | 540  |
| tgagtgttat | gtgattttcc  | attttaaatg  | aagctagaaa | gttgctggtt | aataatgttg | 600  |
| ctatgtcatg | agaattataa  | ggacactatg  | taaatgtagc | ttaataataa | ggtttgattt | 660  |
| gcagagatgc | cacatcttac  | atggaacatt  | tggtgaaagc | tctagagaaa | aaatgcgggt | 720  |
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| cgggccaccc | gtcccgtgta  | gcctcacagt  | tcctacaaga | cctcaaacia | ttggtggaaa | 840  |
| aaactagcag | cgagaacgaa  | ggaaagccag  | tgatactcct | ctcccatagc | ctaggaggac | 900  |
| ttttcgtcct | ccatttcctc  | aaccgtacca  | ccccttcctg | gcgccgcaag | tacatcaaac | 960  |
| actttgttgc | actcgtctgc  | ccatggggtg  | ggacgatctc | tcagatgaag | acatttgctt | 1020 |
| ctggcaacac | actcgggtgc  | ccttttagtta | accctttgct | ggtcagacgg | catcagagga | 1080 |
| cctccgagag | taaccaatgg  | ctacttccat  | ctaccaaagt | gtttcacgac | agaactaaac | 1140 |
| cgcttgctgt | aactccccag  | gttaactaca  | cagcttacga | gatggatcgg | ttttttgcag | 1200 |
| acattggatt | ctcacaagga  | gttggtgcctt | acaagacaag | agtgttgctt | ttaacagagg | 1260 |
| agctgatgac | tccgggagtg  | ccagtcactt  | gcataatagg | gagaggagtt | gatacaccgg | 1320 |
| aggttttgat | gtatggaaaa  | ggaggattcg  | ataagcaacc | agagattaag | tatggagatg | 1380 |
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| tagagattga | tggagtttgc  | catacatcta  | tacttaaaga | cgagatcgca | cttaaagaga | 1500 |
| ttatgaagca | gatttcaatt  | attaattatg  | aattagccaa | tgtaaatgcc | gtcaatgaat | 1560 |
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<210> 10b

<211> 3896

<212> DNA

<213> Arabidopsis thaliana

<400> 10b

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| atttgcgggtg | gccgaactgc  | ggtggaggat  | gagaccgagt  | ttcacggcga | ctactcgaag | 120  |
| ctatcgggta  | taatcattcc  | gggatttgcg  | tcgacgcagc  | tacgagcgtg | gtcgatcctt | 180  |
| gactgtccat  | acactccgtt  | ggacttcaat  | ccgctcgacc  | tcgtatggct | agacaccact | 240  |
| aagggtccgtg | atcttcatatt | ccttcgctcc  | ttattctgtc  | ggtcgagtc  | cttggtgatg | 300  |
| aattccaagc  | gaaatatagc  | aatgaagcat  | gtctcgtctc  | tcttattgat | tcgttcatta | 360  |
| gtcaacagtg  | acgcttctga  | atctgagttt  | agagtcatat  | aaaacagctg | actcggcgag | 420  |
| tgtttcccat  | cgtttttggt  | tcgctaaatg  | tagecgcaatg | aatgtgtaat | tagtctgcgc | 480  |
| tttttattca  | actagatctg  | caagtttttc  | agagtgtc    | atagtagtta | gaaaatgtta | 540  |
| ggtcatttta  | cttggtgcatt | gtgattcttt  | tggttggtgc  | ttactgatcg | acgtgatgga | 600  |
| tggtttacag  | cttctttctg  | ctgtcaactg  | ctggtttaag  | tgtatgggtg | tagatcctta | 660  |
| taatcaaa    | gaccatcccc  | agtgtgaagtc | acggcctgac  | agtggctctt | cagccatcac | 720  |
| agaattggat  | ccagggttaca | taacaggtag  | tttcggattt  | ttctttcttt | tgagttttct | 780  |
| tcaatttgat  | atcatcttgt  | tgtgatataa  | tatggctaag  | ttcattaatt | tggtcaattt | 840  |
| tcaggctctc  | tttctactgt  | ctggaaagag  | tggtttaagt  | ggtgtgttga | gtttggtata | 900  |
| gaagcaaatg  | caattgtcgc  | tgttccatac  | gattggagat  | tgccaccaac | caaattggaa | 960  |
| gagcgtgacc  | tttactttca  | caagctcaag  | ttagtcctta  | tcaggcta   | gtcttttatc | 1020 |
| ttctcttttt  | atgtaagata  | agctaagagc  | tctggctcgtc | ttcctttttg | caggttgacc | 1080 |
| tttgaaactg  | ctttaaaact  | ccgtggcggc  | ccttctatag  | tatttgccca | ttcaatgggt | 1140 |
| aataatgtct  | tcagatactt  | tctggaatgg  | ctgaggctag  | aaattgcacc | aaaacattat | 1200 |
| ttgaagtggc  | ttgatcagca  | tatccatgct  | tatttcgctg  | ttggtaccgg | cctactatcc | 1260 |
| ttaagttacc  | attttatttt  | ttctctaatt  | gggggagtta  | tggtgtgact | tactggattg | 1320 |
| agctcgatac  | ctgatttgtt  | gttgatttag  | gagctcctct  | tcttggttct | gttgaggcaa | 1380 |
| tcaaactctac | tctctctggt  | gtaacgtttg  | gccttcctgt  | ttctgaggtg | acctctgact | 1440 |
| tctcttttagt | tttaagtagt  | tgatatcaac  | caggtcttat  | aactcactgg | attttctctt | 1500 |
| tgaaagtatt  | acttttggtta | attgaactgc  | tgtacgcgat  | atggtatctg | tagatcttga | 1560 |

B'  
unf

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<211> 709

<212> DNA

<213> tomato

<400> 11b

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Sub  
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B<sup>1</sup>  
cont.